

**REMARKS**

Entry of the foregoing and reexamination and reconsideration of the subject application, as amended, pursuant to and consistent with 37 C.F.R. § 112, are respectfully requested in light of the following remarks.

The following remarks are offered in complete response to the Office Action dated September 12, 2007. In light of these remarks, reconsideration of the rejections and examination of all of the claimed subject matter on the merits are respectfully requested.

Claim 1 has been amended to recite that the at least one metal oxide is present as at least partially crystalline particles. Support for this amendment is found on page 8, line 6 of the specification. Claims 2-16, 18-23 and 26 have been amended to recite proper claim language by replacing "A" with "The" in the preamble of each of these claims. Claims 6 and 26 have been amended to recite that the percent composition is a mole %. Support for this amendment is found on page 9, lines 20-24 of the specification. Claim 25 has been amended to recite that the claimed catalyst comprises at least one catalytic species and a material according to claim 1, wherein the material according to claim 1 is a support for the at least one catalytic species. Support for this amendment is found on page 22, lines 4-7.

New claim 27 has been added. Claim 27 depends from claim 18 and recites the processes deleted from claim 18. Support for this amendment is found in claim 18 and on page 16, lines 10-11 of the specification.

No new matter has been added in making these amendments.

Claims 1-27 are pending in this application.

Applicants gratefully acknowledge the Examiners withdrawal of the Restriction requirement.

### **Specification**

The Examiner has pointed out that the pages in the specification are not numbered and has requested that the specification be corrected. A copy of the replacement specification with page numbers added is enclosed.

### **Claim Objections**

Claim 5 has been objected to under 37 C.F.R. 1.75(c) as being of improper dependent form for failing to further limit the subject matter of a previous claim.

The Office Action alleges that claim 1 requires that the metal oxide nanoparticles be in the crystalline state, which state constitutes a degree of crystallinity of at least 50% by definition. The Office Action further alleges that claim 5 describes a degree of crystallinity of below 50% and thus fails to further limit the subject matter of claim 1.

Applicants respectfully maintain that claim 5 does further limit claim 1 for the following reasons. The specification states:

In addition to an ordered arrangement of their pore network, the presence of said partially crystalline particles in the mineral phase endows the mesostructured materials of the invention with an overall degree of crystallinity which is generally at least 10% by volume, and is preferably more than 30% by volume, said overall degree of crystallinity being calculated by multiplying the volumic degree of crystallinity experimentally determined for the particles using the method described above by the fraction of the volume of material which is occupied by said particles. (See page 8, lines 6-13) (Emphasis added by Applicants' representative)

Based on this definition of how the degree of crystallinity is calculated, the degree of crystallinity of the composition of claim 1 does not have to be at least 50%, as indicated in the Office Action. In fact the specification teaches that it is generally at least 10%. Claim 5 further limits claim 1 by reciting that the metal oxide present within said particles with nanometric dimensions has a degree of crystallinity of 30% to 100% by volume.

Applicants therefore maintain that claim 5 further limits the subject matter of claim 1, from which it depends, and therefore believe that claim 5 is proper.

Claims 2-16 and 18-26 have been objected to for the grammatical informality of the preamble reciting "A" rather than "The."

Claims 2-16, 18-23 and 26 have been amended to recite "The" in the beginning of the preamble. Claim 24 and 25 have not been amended because Applicants believe the preamble of these claims should recite "A".

**35 U.S.C. §112 second paragraph**

Claim 11 has been rejected under 35 U.S.C. §112, second paragraph, as purportedly failing to set forth the subject matter which applicant regards as the invention.

The Office Action alleges that claim 11 is different from what is defined as the Applicant's invention because the specification describes a preferred embodiment in which the mineral phase "is at least partially constituted by silica" but claim 11 recites that the mineral phase "further comprises silica." (emphasis added by Applicant's representative).

Applicants respectfully submit claim 11 is not different from what is defined as the Applicant's invention, but rather claims a preferred embodiment of the Applicant's invention. The specification teaches that the mineral phase constitutes an amorphous phase which is partially crystalline and that preferably the mineral phase is at least partially constituted by silica. (see page 11, lines 18-21). The invention does not require silica in the mineral phase and the presence of silica in the mineral phase is a preferred embodiment of the invention.

Applicants request that the Examiner withdraw the rejection of claim 11 under 35 U.S.C. §112, second paragraph.

Claims 6, 18, 24 and 25 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The Office Action indicates that the basis for which the percent of the composition is calculated is not clear in claims 6 and 26.

Claims 6 and 26 have been amended to recite that the percentages are mole percentages.

The Office Action indicates that the phrase "in particular" renders claim 18 indefinite.

Claim 18 has been amended to recite the step of eliminating the templating agent and the phrase "in particular by heat treatment or by entrainment by a solvent" has been deleted.

The Office Action indicates that claim 24 is unclear because the term "support" is confusing in the claim context.

Applicants' respectfully submit that the term "support" as used in claim 24 is clear because the claim recites a material comprising (a) a mineral phase ... and (b) a catalytic species, wherein the mineral phase comprises a support for the catalytic species. The term that a material is a "support" for a catalytic species is a term of art that is well known. Applicants direct the Examiner to the following classes and subclasses of the United States Patent Classification (USPC) System which demonstrate that the term "support" for a catalyst is well known to one of ordinary skill in the art: (1) Class 502 - Catalyst, Solid Sorbent, or Support Therefor: Product Or Process Of Making; (2) Subclass 400 - Solid Sorbent; and (3) Subclass 439 Miscellaneous (e.g., carrier or support, per se, or process of making, etc.): Product serving as a substrate for the catalyst or sorbent and the process of preparing the same. Applicants therefore believe that claim 24 does set forth the subject matter which the applicants regard as their invention.

The Office Action indicates that claim 25 is indefinite because the process step "supporting" is not clearly defined.

Amended Claim 25 does not recite the step of "supporting" a catalyst on a material.

Applicants request that the Examiner withdraw the rejection of claims 6, 18, 24 and 25 under 35 U.S.C. §112, second paragraph.

**Double Patenting**

The Examiner had provisionally rejected Claims 1-6 and 10-26 on the ground of non-statutory obviousness-type double patenting as being unpatentable over claims 1-36 of co-pending Application No. 10/466,592. The Examiner has indicated that although the conflicting claims are not identical, they are not patentably distinct from each other because the instant claims and the referenced claims are directed to the same subject matter.

Applicants request that this matter be held in abeyance until such time as one of the applications is otherwise allowable. It is believed to be premature to file a terminal disclaimer before the scope of the claims has been settled. In the event that the Examiner is ready to allow this application except for this rejection, she is asked to contact the undersigned so that an appropriate terminal disclaimer can be promptly prepared and filed.

**35 U.S.C. §102(b) prior art rejections**

Claims 1-6 and 10-26 have been rejected under 35 U.S.C. §102(b) or 102(e) as being anticipated by FR-2819432, published as US 2004/0192947 (US'947). For each of the claims, the Office Action lists specific paragraphs in US'947 that allegedly recite the elements listed in the claim.

It is well established that in order to demonstrate anticipation over 35 U.S.C. § 102(b), each feature of the claim at issue must be found, either expressly described or under principles of inherency, in a single prior art reference. See, *Kalman v. Kimberly-Clark Corp.*, 218 USPQ 789 (Fed. Cir. 1983).

The present invention concerns a mesostructured material comprising a mineral phase within which are dispersed nanoparticles. The nanoparticles are crystalline and comprise (1) a first metal oxide selected from oxides of cerium, zirconium, titanium and rare earth metals other than cerium, and (2) another metal which is in cationic form and is in solid solution in the crystalline lattice of the first metal oxide. The presence of the second metal being in solid solution is an essential element that distinguishes this invention from the cited prior art. This feature is specifically described on page 9, lines 8-19 of the specification. The term "element M is in solid solution within the crystalline lattice of said oxide" means that the cations M are present as insertion and/or substitution cations within the crystalline first metal oxide, which plays the role of a host crystalline lattice. The presence of a solid solution can be determined using X-ray defraction, as indicated in the specification. The solid solution retains the structure of the pure crystalline first metal oxide, but is evidenced by slight modifications to the lattice parameters. A comparison of the X-ray diffraction diagram of pure first metal oxide with an X-ray diffraction diagram of a solid solution where cations of element M are in solid solution within the crystalline lattice of the first metal oxide shows a change in offset in the peaks. The requirement that second metal be in solid solution in the crystalline lattice of the first metal oxide is an essential element that distinguishes this invention from the cited prior art.

US 2004/0192947 discloses a mesostructured material comprising a mineral phase within which is dispersed nanoparticles based on a rare earth element and a transition element. The nanoparticles of US'947 are just mixed oxide. The metals in the nanoparticles of US'947 are not in the form of a solid solution of cations of the

second metal in the first metal oxide. This is described in paragraphs [0064]-[0069] of US'947 which provide specific examples of perovskites as mixed oxides.

The claims of the instant application are not anticipated by US'947 because the current claims require that a second element M, which is in cationic form, is in solid solution within the crystalline lattice of said oxide and this feature of the claims of the instant application is not found in US'947.

Applicants respectfully submit that the claims are not anticipated by FR-2819432 (published as US 2004/0192947) and therefore request that the rejection be withdrawn.

**35 U.S.C. §103(a) prior art rejections**

Claims 1-26 have been rejected under 35 U.S.C. §103(a) as unpatentable over WO-01/32558. (Applicants note that WO-01/32558 is published in English as US 6,866,925.)

Applicants respectfully submit that claims 1-26 are not obvious over WO-01/32558 and these claims are allowable.

To establish a *prima facie* case of obviousness, three basic criteria must be met. (MPEP 2143) First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations.

WO-01/32558 (WO'558) teaches a thermally stable mesostructured material comprising a mineral phase and nanoparticles of oxides of cerium, zirconium,



titanium, aluminum, ytterium, lanthanides and transition metals. The Office Action indicates that WO'558 does not teach doping of the nanoparticles, but indicates that doped nanocrystals are known in the art as having superior or at least improved physical, chemical and optical properties relative to their undoped counterparts. The Office Action references U.S. Patents 6,623,858; 6,656,588; 6,955,855 and 7,025,943. The Office Action alleges that one of ordinary skill in the art would have found it obvious to replace the undoped nanoparticles taught in WO'558 with doped nanoparticles in order to obtain material with better properties.

The instant invention differs from merely using doped nanocrystals. While U.S. Patents 6,623,858; 6,656,588 and 6,955,855 describe the use of doped nanocrystals, they do not describe that the doped nanocrystals are a metal oxide in the form of a solid solution. With regards to U.S. Patent 7,025,943 ('943), the filing date of the '943 patent (May 15, 2002) is later than the priority date (January 21, 2002) of the present application. Therefore U.S. Patent 7,025,943 should not be referenced as prior art to the instant application.

To establish a *prima facie* case of obviousness, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. There is no suggest in the cited prior art to modify WO'558 to obtain the claimed mesostructured material where dispersed particles of nanometric dimensions comprise at least one metal oxide present as at least partially crystalline particles, and at least one metallic element in the cationic form, where the metallic element in the cationic form is in solid solution within the

crystalline lattice of the metal oxide. Even if one of ordinary skill in the art were to modify the teachings of WO'558 with any of the three US patents cited for teaching doping of nanoparticles, one would still not obtain the instant invention where a second metal is in cationic form and is in solid solution in the crystalline lattice of the first metal oxide. Therefore there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings to obtain the instantly claimed invention.

To establish a *prima facie* case of obviousness, there must be a reasonable expectation of success in obtaining the claimed invention. There is no reasonable expectation of success in obtaining the claimed invention based on the teachings in cited prior art because, as shown above, the combination of the cited art would not produce the claimed invention. It is only through knowledge obtained from reading the instant specification that one of ordinary skill in the art could obtain the current invention because the cited prior art does not teach all of the elements of the application. Therefore one of ordinary skill in the art at the time of the invention would not have had a reasonable expectation of success in obtaining the claimed invention.

To establish a *prima facie* case of obviousness, the prior art reference (or references when combined) must teach or suggest all the claim limitations. As discussed above, none of the prior art references teach or suggest that the metallic element in the cationic form is in solid solution within the crystalline lattice of the metal oxide. Therefore, the prior art references, either alone or combined do not teach or suggest all the claim limitations.

Applicants respectfully submit that the claims are not obvious over WO-01/32558 in view of U.S. Patents 6,623,858; 6,656,588 and 6,955,855 and the rejection should be withdrawn.

From the foregoing, Applicants earnestly solicit further and favorable action in the form of a Notice of Allowance.

If there are any questions concerning this paper or the application in general, Applicants invite the Examiner to telephone the undersigned at the Examiner's earliest convenience.

Respectfully submitted,

BUCHANAN INGERSOLL & ROONEY PC

Date: December 11, 2007

By: /Gary Mangels/  
Gary D Mangels, Ph.D.  
Registration No. 55424

P.O. Box 1404  
Alexandria, VA 22313-1404  
703 836 6620